Major Research Project

On

Effect of Macroeconomic Variables on Stock Market: Indian Perspective

(April 2011-March 2020)

Submitted By

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CERTIFICATE FROM THE INSTITUTE

This is to certify that the Project Report titled **"Effect of Macroeconomic Variables on Stock Market: Indian Perspective (April 2011 – March 2020)"**, is a bonafide work carried out by **Ms. Mansi Singhal** who is a student of MBA 2018-20 batch at Delhi School of Management, DTU, Delhi. The project is submitted to Delhi School of Management, Delhi Technological University in partial fulfilment of the requirement for the award of the Degree of Masters of Business Administration.

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CANDIDATE'S DECLARATION

I, Mansi Singhal, student of MBA 2018-20 batch of Delhi School of Management, Delhi Technological University, Bawana Road, Delhi – 110042, hereby declare that the major research project report on **"Effect of Macroeconomic Variables on Stock Market: Indian Perspective (April 2011 – March 2020)"** submitted in partial fulfilment of Degree of Masters of Business Administration is the original work conducted by me under the guidance of Professor G C Maheshwari.

The information and data given in the report is authentic to the best of my knowledge. This report is not being submitted to any other University for award of any degree, diploma and fellowship.

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Abstract

Macroeconomic variables are interlinked with each other and their interaction provides synergy and has a significant impact on the investment sentiments in the market. This interplay among them helps in bringing steadiness in the economy. Indian economy in the recent past had experienced a volatile situation in its financial markets. Given the current time when the international crude oil prices are touching skies and INR is very volatile with respect to $ counterpart, the study about effect of various macro-economic variables on Indian stock indices have become more significant. Also foreign exchange markets are quite volatile these days and show a continual weakening of rupee against dollar which is followed by an increase in gold rate, crude oil rate etc.

The key objective of this study is to examine the impact of selected external macroeconomic variables on Indian Stock Market and relationship between them. For the purpose of this study eight macro-economic variables such as Exchange Rate (USD), Crude Oil prices, Gold Prices, Foreign Institutional Investments (FIIs), Foreign Direct Investment (FDIs), Consumer Price Index (CPI), Index for Industrial Production (IIP), Trade Balance have been used to magnify the impact of external macroeconomic variables on Indian Stock Market (Nifty 50). The study investigates effect of macroeconomic factors on the performance of the Indian Stock Market using monthly time series data over the period April 2011 to March 2020 for eight variables taken into study, and one stock market index namely Nifty50. In order to examine the relationship among these variables various statistical techniques are used like the Descriptive Statistics, Correlation analysis and Multivariate Regression analysis using SPSS. Result of this study help in exploring whether the movement of NIFTY 50 index is the result of some selected macroeconomic variables. The result of this research project shows that crude oil rate, FII, CPI and IIP have positive relation with NIFTY 50 while other variables have negative relation with NIFTY 50. Also exchange rate, FII, CPI and trade balance have statistically significant impact on NIFTY 50 while other variables impact is not statistically significant. This implies that major variation in NIFTY 50 price is explained by exchange rate, FII, CPI and trade balance.

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1. Introduction

1.1 Overview

In today's world, the Indian stock market is quite a developing market. After the Indian Government started with LPG (Liberalisation, Privatisation and Globalisation) policies, Indian Stock market has seen a tremendous change. Due to this there is a widespread importance of stock market nowadays. Stock market is one of the driver of economy and also helps in mobilisation of capital. Eventually, this will definitely accelerate the economic and financial development of the country..

In 2019-20, the GDP growth rate is approximated at 5% as compared to 6.8% in 2018-19 as per Economic survey 2019-20. The GDP growth rate had declined because of slacking growth of consumption and a consistent reduction of investment in fixed assets. Since the financial crisis of 2009, the global output growth was increasing at its slowest speed of 2.9% in 2019 as per the survey. The inflation rate based on CPI rises to 4.1% in 2019-20 compared to 3.7% in 2018-19 attributed to a rise in food inflation. The inflation rate based on Wholesale Price Index (WPI) reduced to 1.5% in 2019-20 compared to 4.3% in 2018-19. Currently, the fiscal deficit and primary deficit are 3.3% and 0.2% of GDP respectively. Also the value of Index of Industrial Production is estimated at 0.6% during the same period. It measures the performance and growth of various (different) industries or industry groups which are existing in an economy.

Stock markets are one of the significant variables, which is considered as in marker of monetary development of a nation is getting progressively coordinated with money related markets as well as various financial indices. For the most part, stock markets are impacted by a few interconnected monetary, social and political variables and these components cooperate and interact with one another in a many-sided way like crude oil value, gold value, exchange rate, exports, imports and so on and they all have broad financial effects on money related exercises, and all segments of Indian economy. This effect is straightforwardly clear in utilization, industrial production and investment in both real and financial sectors; and makes a few ramifications in the capital market of the India and by implication display itself in inflation and

unemployment. Impact of one market on another market is not a new thing, however the significant thing is to appropriately comprehend the effect degree, co developments and the causality factor between the business sectors and various markets

The Indian Stock Market fills in as a benchmark for the general status of the Indian Economy and macroeconomic factors do have a huge impact, positive and negative, on the presentation of the capital market of India, so it is essential to contemplate these elements to decide the pattern in the Stock Market of India.

1.2 Need of the Study

Stocks markets have been viewed as an indispensable part of financial sector of any nation. This study is important in view of the following observations:

- Besides helping in the mobilisation of capital from one sector to another or from the area of surplus funds to the area where there is a deficit, it helps in the growth and development of commerce and trade in an economy. So in that sense it is important to conduct this study in view of the growing importance of stock markets in the developing economies.

- Also nowadays, there are a lot of people who are interested in stock markets may be because of widespread awareness about investments and savings. This can also be viewed as a shift in people mind-set. So this study will be very helpful to those who either are investing in stock markets or are thinking of investing (potential investors). They will better be able to understand the individual impact as well as combined effects of various macroeconomic variables on the stock market and hence this will help them in some way to better make their investment portfolio.

There are various types of investors like individuals, institutional investors, and portfolio managers etc. who may find this study useful. Also companies can also use this study to raise money from stock market in view of the current scenario as this will going to have an impact on the intrinsic value of shares.

Also effect of one market on another market is not a new thing, but the important thing is to properly understand the impact degree, co movements and the causality factor between the markets.

Also there are studies present on this topic but none of the research papers and reports had studied the impact of all the variables taken here in their studies in a combined way. Some researched only about two or three variables in a go. Only very few studies are available who had taken so many variables into consideration. As far as I have studied the available literature and reports, so far no study has taken the time frame of 2011-20. So this report is very useful besides the current literature available on impact of various variables on stock market in India.

1.3 Research Objectives

 The objectives of this study are as follows:

- To identify the relation between many variables and the stock market of India.The macroeconomic variables namely Index of Industrial production (IIP), Consumer price Index (CPI), Exchange Rate(USD), Foreign Institutional Investment (FII), Crude Oil Prices (CO), Gold Price (GP), Foreign Direct Investment(FDIs), Trade Balance. NIFTY 50 has been considered representing the Indian Stock Market.
- To analyze the effect of macroeconomic factors/variables on NSE Nifty index.
- To study the individual as well as combined effects of all variables on Indian stock Market index.
- To examine the existence of correlation between macroeconomic variables and stock market index.

1.4 Scope of Study

- This study includes various macroeconomic indicators namely Gold Price, Crude Oil price, Exchange Rate, Consumer Price Index, Foreign Institutional Investment, Trade Balance, Index for Industrial Production and Foreign Direct Investment. So in this manner the study is restricted to only 8 macroeconomic variables.
- During the period under study, there may be some variation in selected variables may be due to some external business environment factors which may include political, social, economic, legal and cultural etc.
- The techniques used in this study are descriptive statistics, analysis using correlation and multivariate regression analysis using SPSS, to find the relationship between selected macroeconomic variables and stock market.
- To depict a broader view of this relationship, a time period of 9 years has been chosen from April, 2011 to March 2020.
- Besides domestic economic factors, various other variables have been included to analyse the impact of foreign markets and external movements. These include exchange rate movement, trade balance (exports and imports), Foreign Institutional Investments and Foreign Direct Investment.

2. Literature Review

Various financial analysts and industry experts have conducted experimental investigations to analyse the impact of various macroeconomic variables on stock prices or vice a versa. They delve deeper into the experiments to examine the relationships between variables and stock prices and analyse the interplay among these factors as well. So here are some past research papers and studies and their results and discussions based on their experiments and analysis.

Gurloveleen & Bhatia, (2015) used Augmented Dickey Fuller Test (ADF), Multi regression and Granger Causality test for analysing the effects of macroeconomic variables on the prices of stocks. Using the ADF test, the data was tested for stationarity and then multiple regression models were used to find the correlation between the independent variable and the stock market. It was found that only exchange rate and FIIs was found to have a significant effect on the volatility of the Indian Stock Market but they had no unidirectional and bidirectional effect on the closing prices of the stock selected for research.

Mishra, (2018) explains the effects of macroeconomic variables such as IIP, Inflation, interest rates, Gold Prices, Exchange rate, FIIs and money supply; on the Indian Stock Market. It was concluded with the help of Johannsen Cointegration and VECM that there is a strong long-run relationship between the independent variables of interest rate, IIP, inflation, gold, exchange rate, money supply, FIIs and stock market. According to the research, the short-run association was found only between inflation, money supply and stock market. Other variables like crude oil prices have been excluded from this research.

Gay Jr., (2016) has used two macroeconomic variables in his research i.e. the exchange rate and oil prices to study the relationship between the independent variables and the stock market index. For this, the Box Jenkins ARIMA technique was used which analysed that there was a positive relation found between the exchange rate and the stock market. Also there was a negative relation found between the oil prices and the stock market. The effect of these two variables was not found to be

having a significant relationship as other macroeconomic variables also affects the stock market and have a role in determination of stock prices.

Aanchal, (2017) tried to test the stock market of India through this study. For this study; GDP, Inflation, Export, Import and Investments are was taken as performance indicator of the economy of India. It was found that all the independent variables were non-stationary in nature and the market data was also nonstationary. It was also found that none of the variables i.e. both the independent and the dependent variable, had any relationship. Although it was analysed that exports was affected due to GDP and GDP was affected due to inflation. It was found out that only inflation had a negative correlation with GDP, exports and imports, and all other variables were positively correlated. It can also be said that the stock market of India was positively correlated to all macroeconomic variables used in the research. It can be concluded from the research that, Indian stock market is not all dependent on the variables used in the study and vice versa as there are many other factors which explains the volatility in the Indian stock market.

Ahuja, Makan, & Chauhan, (2012) tries to find a relation between the macroeconomic variables like Industrial production, inflation, Call rate, exchange rate, Gold price, Oil prices, FIIs and the stock market of India. Various sectoral indices were also taken into account for the purpose of studying the relation between the macroeconomic variables and the capital markets. Using the regression and correlation technique, it was found out that exchange rate, call rate and FIIs were more significant to the Indian Stock Market than the other macroeconomic variables taken in the study. Except the exchange rate, both FIIs and the call rate affected the stock market positively. It can be concluded by the study that the stock market is significantly affected by some macroeconomic variables and should be taken into account by the investors for revenue generation.

Ramanujam & Leela, (2011) examines the effect of various macroeconomic variables like GDP, exchange rate and Industrial Production; on the stock market. For the dependent variables, CNXNIFTY was taken into study and summary statistics was derived. It was found out that IIP and exchange rate had a significantly negative effect on the stock market while on the other side, GDP had a significantly positive effect on the capital market. As the GDP of a country increases, the demand

increases which effects the stock prices. Using the Wald test, the results were proved that theses variables have a long term effect on the stock market.

Kwon and Shin (1999) used two tests: Granger causality test and Engle-Granger Cointegration test. This study was conducted in Korean Stock market. The causality test shows that stock market index (Korean Stock Market Index) was not a major indicator for selected macroeconomic variables. Whereas the Cointegration test shows that the economic variables are cointegrated with Korean Stock market.

Ibrahim (1999) researched about the interplay between seven economic variables and Malaysian Index, .i.e., KLSE Composite Index. The variables include Consumer Price Index, money supply components M1 & M2, foreign reserves, Index of Industrial Production, exchange rate and credit aggregates. This study found that the stock market in Malaysia was inefficient.

Pethe and Karnik (2000), conducted the study in Indian perspective to find out whether stock price prices are affected by macroeconomic variables or variables are affected by stock price indices. The data used were from period April, 1992 to December, 1997. However this study is not statistically correct and sound because it applied granger causality tests in an error correction structure on non-cointegrated macroeconomic variables. The Sensex and S&P CNX Nifty has been chosen as stock prices indices. A weak causality was found from IIP to indices but not vice a versa. So this concluded that stock prices are affected by state of economy of any country.

Bhattacharya and Mukherjee (2002) studied about the causal relationship between five macroeconomic factors and stock market index in Indian perspective. The five macroeconomic variables are money supply, national income, inflation rate, interest rate, and IIP. BSE Sensitive Index has been chosen for stock market indices. For the purpose of this study, monthly data has been used for a period ranging from 1992-93 to 2000. The techniques used were co-integration test, unit-root tests and Granger causality test (long run). Long run granger causality test was proposed by Toda and Yamamoto (1995). Findings of this study reveals that there was no relationship between BSE Sensitive Index and other macroeconomic variables except for Index of Industrial Production. Also inflation and stock prices showed a two way causation.

Chen (2008) studied whether recession in the stock market can reliably be predicted using macroeconomic variables. Variables under study are unemployment rate,

aggregate output, money stocks, inflation rates and interest rate spreads. All of these variables are analysed individually. S&P 500 showed from empirical evidences that the recessions in US stock market are most reliably predicted by yield curve spreads and inflation.

Ahmed (2008) investigated about the causal association between major economic variables at macro level and stock prices. For stock prices, two indices namely Nifty and Sensex have been chosen. Variables are chosen in such a way that they represent real and financial sectors in India, these are FDI, money supply, interest rate, IIP, exports, exchange rate). Long term associations have been analysed using Johansen's co-integration approach and Granger causality test. BVAR modelling and impulse response functions have been applied to analyse variance decomposition and short term associations respectively. A series of quarterly data has been used. This study found that volatility in stock prices if affected not only by macroeconomic variables but also by various other macroeconomic dimensions. It also indicated that besides actual performance, expected potential performance also drives the Indian stock market. Also economic activity is led by fluctuations in stock prices except interest rates because they are not led by instead lead to fluctuations in stock prices.

Singh (2014) studied about the association between macroeconomic variables and Indian stock market. To analyse the impact and causal relationship among variables and stock market various econometric techniques have been used like correlation analysis, multiple regression, and Granger's causality tests. The results show that there is no causal relationship among the selected macroeconomic variables. Also economic variables have a significant impact on the stock market. Besides this, FII to stock market shows a causal relationship.

Tripathy (2011) apply various tests like Ljung-Box Q test, Breusch-Godfrey LM test, Unit Root test, Granger Causality test to examine the market efficiency and causal relationship between selected index representing Indian Stock Market and various macroeconomic variables. The study reaffirm that the market is a form of Efficient Market Hypothesis due to the presence of autocorrelation between Indian Stock Market and selected macroeconomic variables. A bidirectional relation was observed between Indian stock market and interest rate & exchange rate, BSE volume and international stock market & exchange rate. Also international stock market shows

unidirectional causality towards domestic stock market and macroeconomic variables. This concludes that there is a significant influence of international stock market on Indian stock market fluctuations.

There are various other studies that have analysed the relationship between stock prices or returns and long- term bonds (Fama and French, 1989), Tobin's q theory (Barro, 1990), Fama, 1990;; Humpe and Macmillan, 2009), budget deficits (Darrat, 1990a; Abdullah and Hayworth, 1993), the money supply (Bulmash and Trivoli, 1991; Abdullah and Hayworth, 1993; Dhakal, Kandil and Sharma, 1993; Humpe and Macmillan, 2009), interest rates (Bulmash and Trivoli, 1991; Abdullah and Hayworth, 1993; Dhakal, Kandil and Sharma, 1993; Humpe and Macmillan, 2009), the exchange rate (Abdullah and Hayworth, 1993; Choi, 1995; Ajayi and Mougoue, 1996; Nieh and Lee, 2001), the inflation rate or the consumer price index (Chen, Roll and Ross, 1986; Abdullah and Hayworth, 1993; Dhakal, Kandil and Sharma, 1993; Humpe and Macmillan, 2009), and other related variables. Their findings suggest that most of these variables are associated with stock prices or returns to varying degrees.

3. Research Methodology

3.1 Variables Selection and Data Sources

For the purpose of the research study, secondary data has been used to analyse the effect and the influence of macroeconomic determinants on the stock prices of India and their relationship. The study was conducted for a time period ranging from April 2011 to March 2020. Monthly data has been considered for detailed analysis. The following are the sources of data collection:

1. **Nifty50:** Data on closing prices of NIFTY 50 index has been collected from official website National Stock Exchange (NSE website).

2. **Gold and Crude Oil Rate:** Data on gold and crude oil prices has been collected from official website of Multi Commodity Exchange (MCX website).

3. The data on other variables like Exchange Rate, FIIs, FDIs, CPI, IIP, Trade Balance have been collected from the official website of **Reserve Bank of India** (RBI website).

Reasons to choose the specific variables:

For this study, to represent the Indian stock market, the index which has been chosen is NIFTY50. The reason to choose this index is that it has broader perspective broader than the other major Indian stock market index, .i.e., SENSEX. The broader view is provided because the securities listed on Nifty50 are 50 which is more than the listed securities on Sensex (30 securities). Also volume of trading is more on Nifty 50 in comparison to Sensex and it also has a more diversified portfolio representing almost all the sectors of the economy. In that sense it provides a more reliable picture.

In India inflation is measured using **Consumer Price Index**. So inflation which is an important macroeconomic variable has been included in terms of CPI and not directly.

Currency fluctuations have major impact in the economy as well on purchasing power, inflation etc. So including exchange rate is important. **USD exchange rate** is used because it is accepted for trade worldwide and the strong currency.

Trade balance has been chosen to accommodate the effects of external world and its related trade practices on Indian stock market. **Foreign Institutional Investment (FII) and Foreign Direct Investment (FDI)** are included because they represent foreign investors sentiments and worldwide investment scenario. They help in analysing the attractiveness of the market.

Also **Crude oil prices and Gold prices** have a huge impact on the overall pricing mechanisms as well as stock prices. This can be evident from the previous researches.

As only quarterly time series data is available for the GDP growth rate, this study is not able to incorporate this factor into consideration as it proved to be inconsistent with other data collected. So instead of this, **Index of Industrial Production** has been used as its proxy as it measures the growth and performance of various industries existing in an economy.

Also there are numerous studies that link the fluctuations of selected macroeconomic variables with Indian Stock Market:

 Darby, (1982); Hamilton, (1983), Evangelia P (2001); Akttam (2004); Cobo-Reyes and Quirós (2005); Irene H & Perry S (2007); Chen (2010); Basher, Haug and Sadorsky (2012); Ansar and Asghar (2013); Abdalla (2013); Darat and Mukherjee (1987) are the studies on **oil prices with stock market**. The empirical evidence with respect to the relationship between oil prices and stock markets are not consistent. A number of studies suggested an inverse relationship between oil price and stock returns for example, Filis, 2010; Cunado & Perez de Garcia, 2014. On the other hand, another stream of literature found a positive relationship between oil price and stock markets for example, Boyer and Filion (2004); Sadorsky (2001); Constantinos et al., 2010; Hasan & Mahbobi, (2013).

Toda and Yamamoto (1995); Bhattacharya et al. (2001); Dimitrova (2005); Doong et al (2005); Aydemir and Demirhan (2009); Jorion (1990); Chow, Lee & Solt (1995); Aggarwal (1981); Ajayi & Mougoue (1996); Abdalla (1997); Gay Jr., (2016) studies relationship between **stock market and exchange rate**. Kaliyamoorthy and Parithi (2012) and Patel (2013) Omag (2012), Smith (2001) Garefalakis et al. (2011); Joshi (2012); Ray (2013); Gay Jr., (2016) are the studies on **gold prices and stock market**.

Manjinder Kaur and Dhillon (2010), Hojatallah and Ram Narayana (2011), Mishra, (2018), Gurloveleen & Bhatia, (2015), Mishra, (2018), Ahuja, Makan, & Chauhan, (2012), Aggarwal Priyanka & Manish Manoj Kumar (2012), Mohapatra and Panda (2012), Bhupender Singh (2005), studies relationship **between FII and Stock market** and Ahmed (2008) studies relation between **FDI and stock market** along with other macroeconomic variables as well. Ibrahim (1999), Naka, Mukherjee and Tufte (2001), Singh, (2014), George Filis (2009) establishes a relation between **Consumer Price Index** and NIFTY 50. Mishra, (2018), Ahuja, Makan, & Chauhan, (2012), Ibrahim (1999), Pethe and Karnik (2000), Naka, Mukherjee and Tufte (2001), Bhattacharya and Mukherjee (2002), Ahmed (2008), Ramanujam & Leela, (2011), (Dinkergok, 2016), Singh, (2014), Benaković &Posedel, (2010) studies relationship between **Index for Industrial Production(IIP)** and Indian stock market. There are few studies on **trade balance** relation with stock market like Aanchal, (2017), Ahmed (2008), Singh, (2014), Gurloveleen and Bhatia (2015), Rajesh Jayakar Pai (2014), Shreya Agrawal(2019).

3.2 Description of Variables

Table 3.1: Description of Variables

Symbol	Variable	Base Year	Units
NIFTY	NSE NIFTY 50	1995 = 100	Closing Price in rupees
GP	Gold Prices	Actual Value	Rupee per 10 gm
CO	Crude Oil Rate	Actual Value	Rupees per barrel
USD	Exchange Rate	Actual Value	Rupee per unit of US Dollar
FII	Foreign Institutional Investment	Actual Value	Rupees Billion
FDI	Foreign Direct Investment	Actual Value	Rupees Billion
CPI	Consumer Price Index	2011-12 = 100	_
IIP	Index for Industrial Production	2011-12 = 100	_
TB	Trade Balance	Actual Value	Rupees Billion

3.2.1 Indian Stock Market

NIFTY 50 Index

In 1996, Nifty50 was introduced as a benchmark index of National Stock Exchange. The extended form of Nifty50 is National Index Fifty. Being one of the major stock indices in India, it represents or composed of 50 Indian companies' stocks covering 13 sectors. It is calculated as a weighted average of companies' it comprised of by taking base value as 1000 for year 1995. The other major index is BSE Sensex. However Nifty50 provides a broader view. It takes into account only those companies which are of Indian origin and are included in the Nifty50 index calculation. It is indicative of the major industries and sectors of the economy as IT, oil and auto sectors show a high weightage in its calculations. It comprises of only highly liquid stocks and all of the stocks or components of index are weighted on the basis of free float market capitalisation. Overall the index shows 65% of the total free float market cap. This shows that companies with higher free float market cap have a weightage in calculation of index and thus have a greater impact on the movement of Nifty50 index. For example, Reliance Industries Limited has more free float market cap than Sun Pharma and thus have a greater impact on the index than Sun Pharma.

The movement of index decides the movement of prices in most of the stock under it. If index moves up then most of the stocks under it shows an upward movement in their stock prices and vice-a-versa. From traders' point of view, index helps in taking an action from overall market viewpoint and also for hedging and speculation activities whereas from analysts' point of view index is a kind of representation of the overall market.

3.2.2 Explanatory Variables

Index of Industrial Production (IIP)

Index of Industrial Production is a measure of growth and performance of industries and various industry groups in an economy. It shows the overall production and economic activity of an economy. So in some way it can be used as a proxy for measuring the real sector performance and growth rate. If IIP increases then this shows an increase in production and economic activity in the country which in turn leads to increased revenue and profitability for the companies. This show that overall

there is growth in the economy. This also leads to increase dividends and hence in increase in the stock prices of the companies. So indirectly IIP growth leads to an increase in stock prices over time. Also from empirical studies and various economic theories this is evident that IIP and stock prices shows a positive relationship.

Consumer Price Index (CPI)

Consumer Price Index is the calculation of Inflation by measuring its variation or changes. The cost of living grows and there is a transition of resources from investment towards consumption because of high inflation rate. As a result reduction in demand for instruments (market) and hence fall in volume of traded stock. The rise in inflation rate is signified by the monetary policy. Inflation rate can be interpreted and transformed to a nominal interest rate. Discount rate is increased with increasing nominal interest rate and can hence lead to low present value for cash flows. Corporate profits are influenced from high inflation rate, resulting in diminishing of dividends and less stock price. Rise in discount rates due to tight monetary policies occur with rise in inflation .Also investment decrease in stock market is because of rise in cost of borrowing. It can be concluded there is negative relation between equity prices and inflation.

Crude Oil (CO)

Since Crude oil is a vital factor of production so in actual economic activity its price is added. Because India imports crude oil, in Indian economy it plays an important role.. Investors' investment decisions whether delay or suspension is largely influenced by fluctuations in oil prices. With rise in prices of oil, the healing cost, transportation earnings and cost along with reduced corporate earnings. With decreasing consumer spending fuel prices serve as an alarm too. More the fluctuation in price of oil more is the financial risk. For countries which are importers of oil, such as India, production costs rise with increase in prices of oil, eventually reducing future cash flow and stock market experiences a negative effect. Further adding that increase in the oil prices will cause lower real economic activity therefore causing stock price to reduce, but this is good only in theory.

Exchange Rate

Another macroeconomic indicator is Exchange rate which means the rate of exchange of Indian rupee with respect to one unit of any foreign currency, this is a bilateral nominal rate. Generally and in this case the rupee (Indian) is measured against US dollar ($).The reason behind this is as American Dollar is the most powerful and dominating foreign currency. Us dollar is used in the project for trading and investment analysis. There is a decline in stock prices because of depreciating currency and apprehensions of inflation. A stronger domestic currency adversely affect export oriented companies and import oriented ones have an advantage from it. Also, variation in exchange rate at a micro or deeper level tend to vary the value of domestic and multinational firms' portfolio. So we can say, a negative relationship exists between the power and value of domestic currency with the aggregate stock prices index.

Gold Price (GP)

An alternative investment opportunity for investors In India is the Gold . Indian investors are willing to invest less in stocks with rising gold prices, hence the stock prices fall. It can be estimated that , gold price and stock price have an inverse relationship. This economic indicator is of utmost importance and hence added in this study.

Foreign Intuitional Investment (FII)

This is a type of investing in the country where the investor or fund is from outside the given country and called Foreign Institutional Investment. FII is basically the investment in form of hedge funds, insurance companies, pension funds and mutual funds. FII finds its place in Indian market as quite a common term. SEBI (Securities and exchange board of India) is where international institutional investors register themselves. FII is permitted to start in our country through stock exchanges maybe as equity or debt. FII can be purchased or sold daily and hence impacts the variation in SENSEX. More the daily transactions in FII more is the instability in the stock market With positive flow of FIIs inside the country NIFTY rises & with outflow or negative flow NIFTY decreases.

Foreign Direct Investment (FDI)

Foreign direct investments is a type of investment which uses methods like notching up of an associate company in a foreign nation, mergers or joint venture types of partnerships and also by showing interest in an existing firm by controlling or acquiring it. One of the main ways of sourcing money and also for economic development is FDI(Foreign Direct Investment).India has cheap labour and good business environment which can be taken advantage of by foreign companies. In 1991 after economic crisis economic liberalisation started and after that there has been a steady increase in FDI which consequentially helped in raising more than one crore (10 million) jobs. As said by Financial Times, in 2015 India overtook China and the United States as the major choice of market for the Foreign Direct Investment. In first half of the 2015, India gained an investment of $31 billion compared to $28 billion and $27 billion of China and the US respectively.

On 18 April 2020, to protect Indian companies from "opportunistic takeovers/acquisitions of Indian companies due to the COIV-19 pandemic", India modified its foreign direct investment (FDI) policy as said by the Department for Promotion of Industry and Internal Trade. The policy says that now FDI will be under control and scrutiny of Ministry of commerce and industry but did not restricted the financial market

Trade Balance

Trade balance is the balance maintained between a country's exports and imports. When exports are greater than the imports then it is a trade surplus otherwise trade deficit. In previous month there was a trade deficit of 9.9 US $ and for the month of March 2020 the deficit was stated as 9.8 US $. The data on trade balance of India is available from Jan 1957 to March 2020 as is updated monthly. With value of -374.0 US$ mn. The lowest was -20.2$ US$ in October 2012 and highest in March 1977. CEIC depicts history for monthly Trade Balance. Trade balance in US$ is given by The Ministry of Commerce and Industry. Trade Balance prior to April 1990 is taken from the International Monetary Fund. India's Total Exports reached 21.4 US$ billion in Mar 2020, a decrease of 34.6 % year on year. Total Imports recorded 31.2 US$ billion in Mar 2020, a decrease of 28.7 % year on year."

3.3 Statement of Hypothesis

The hypothesis for this study has been stated below:

Null Hypothesis:

H0: There is no significant relation between Gold price and NIFTY 50.

H0: There is no significant relation between Crude Oil price and NIFTY 50.

H0: There is no significant relation between Exchange Rate (USD) and NIFTY 50.

H0: There is no significant relation between Foreign Investment Inflows & NIFTY 50.

H0: There is no significant relation between Foreign Direct Investment and NIFTY 50.

H0: There is no significant relation between Consumer Price Index and NIFTY 50.

H0: There is no significant relation between Index of industrial production & NIFTY50.

H0: There is no significant relation between Trade Balance and NIFTY 50.

H0: There is no significant relation between all these macroeconomic variables and NIFTY 50.

Alternate Hypothesis:

H1: There is a significant relation between Gold price and NIFTY 50.

H1: There is a significant relation between Crude Oil price and NIFTY 50.

H1: There is a significant relation between Exchange Rate (USD) and NIFTY 50.

H1: There is a significant relation between Foreign Investment Inflows and NIFTY 50.

H1: There is a significant relation between Foreign Direct Investment and NIFTY 50.

H1: There is a significant relation between Consumer Price Index and NIFTY 50.

H1: There is a significant relation between Index of industrial production & NIFTY 50.

H1: There is a significant relation between Trade Balance and NIFTY 50.

H1: There is a significant relation between all these macroeconomic variables and NIFTY 50.

3.4 Theoretical Framework of Analysis

Various tests and techniques have been implemented to achieve the goals of this research. Two types of techniques have been deployed. The first is descriptive statistics and second is inferential statistics. Descriptive statistics includes measures such as mean, standard deviation, skewness, kurtosis, minimum, maximum, range, etc. These measures help in describing the nature and characteristics of data used for the purpose of this analysis. Inferential statistics have been used to make judgements and inferences about the the results by way of various measures like correlation analysis and multivariate regression analysis. Correlation analysis is used to measure the direction and magnitude of relationship between the stock prices and the selected macroeconomic variables whereas regression analysis dependent variable is being predicted by way of movement in the explanatory variables (macroeconomic variables). Regression and correlation never implies causation. F-test is also used to know the overall goodness of fit of the model (ANOVA). Also t test and p value are used to know the significance and reliability of the individual variables whereas F test measures the combined effect.

3.4.1 Descriptive statistics technique

Descriptive statistics is the technique which unravels the trends and patterns in the data. It helps in summarising the data thus provides a bird eye view to the user of the data. It shows any historical fluctuation which may be exists in any particular variable. It helps in providing the minimum and maximum value and range. It also averages out the data. Deviations around the mean can be showed using standard deviation. The square of standard deviation is variance. Standard deviation shows volatility in the variables and stock prices over time. Skewness and Kurtosis measure helps in describing the data and shows whether data is symmetrically distributed or not. Various box plots and charts can also be used to show the trends in the data. Measures used are mean (central tendency), measures of variability and skewness and kurtosis.

3.4.2 Inferential statistics technique

Inferential statistics is a branch of statistics which helps in analysing the data based on the results to make valid conclusions. They are helpful in making inferences and judgements about the nature of sample data being used. The conclusions here are based on the concept of hypothesis testing. A hypothesis is nothing but a kind of proposition based on past evidences and experiences which are formed for the purpose of further investigation. There are two hypotheses: Null Hypothesis (H0) and Alternate Hypothesis (H1). Null hypothesis states that the results are due to pure chance or random errors whereas alternate hypothesis frames that the results are due the fluctuations or variations in independent (explanatory variables). In the study, null hypothesis states that there is no significant relationship between Nifty50 and selected macroeconomic variables while alternate hypothesis states that there is a significant relationship between Nifty50 and selected economic variables. Here we have used correlation analysis and multivariate regression analysis using measures such as R-square, t-ratio, F-test, p-value. Significance level or alpha level used is 5%. Here the analysis is being done using SPSS software.

<u>Correlation matrix analysis</u>

Correlation shows that a change in one variable is accompanied by a change in other variable. It only shows the strength and direction of relationship and not the causality. Coefficient of correlation has value ranges from -1 to +1. The value +1 shows perfect positive relationship between the variables and -1 shows a perfect negative relationship. The absolute value shows the magnitude of change and sign shows the direction. A + sign means an increase in one variable leads to increase in other variable whereas a – sign shows that an increase in one variable leads to decrease in another variable. A correlation coefficient of zero shows that there is no linear relationship between two variables however a non-linear relationship can exist in such situations. Here partial correlation coefficient is used for study. This means studying the relationship between two variables keeping all the other variables as constant. The correlation is Karl Pearson correlation coefficient also known as product moment correlation. The formula for correlation coefficient is:

$$Correlation = \frac{Cov\,(x,y)}{\sigma x * \sigma y}$$

where Cov (x,y) is the covariance between the two variables and denominator shows the product of standard deviations of respective variables. Here it is used to measure the association between Nifty50 and macroeconomic variables.

Econometric Regression Model

Francis Galton proposed the term regression. Regression analysis is concerned with the study of the dependence of one variable, the dependent variable, on one or more other variables, the explanatory variables, with a view to estimating and/or predicting the (population) mean or average value of the former in terms of the known or fixed (in repeated sampling) values of the latter. When only one explanatory variable is considered then the analysis is called as bivariate regression analysis or simple regression. The regression equation is as follows:

$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_n X_n + u_i$

where Y_i is dependent variable and variable X represents explanatory variables, β_0 is the intercept or constant term and β_1 (or β_2 or β_n) represents slope coefficient of the regression line with of respective explanatory variable. The slope coefficient represents the direction and strength of relation between independent and dependent variables. u_i is a random error term that is the error which is not explained by the explanatory variables. In our study the dependent variable is the stock market index and macroeconomic variables are the independent or explanatory variables.

Statistic test

R-square: It is also known as the coefficient of determination which tells how the regression line best fits the data. It measures the %age change in dependent variable that is explained by the explanatory variables.

Sign-F: It tells whether the model as a whole is significant. It shows the combined impact of all the explanatory variables on the dependent variable.

T-ratios: It measures the reliability or the impact of individual variable on the dependent variable. The decision to accept or reject the null hypothesis is based on the corresponding p-value. When p value is less than the alpha value we reject null hypothesis. In case of rejection of null hypothesis we say that the findings are statistically significant.

4. Empirical Analysis

4.1. Descriptive Statistics

Table 4.1: Descriptive Statistics

Descriptive Statistics							
	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
Nifty 50	108	4624.30	12168.45	8201.08	2227.47	.127	-1.230
Gold rate	108	21203.34	38163.29	27234.1	3097.53	1.124	2.013
Crude Oil Rate	108	2004.00	6926.83	4525.82	1227.40	.025	-1.014
Exchange Rate (USD-INR)	108	44.37	74.35	62.42	7.27	-.801	-.050
FII	108	-509.63	646.19	71.95	200.98	-.006	.759
FDI	108	-83.67	212.80	46.60	45.73	1.040	3.761
CPI	108	97.80	150.40	123.30	15.45	-.134	-1.167
IIP	107	98.30	144.10	115.53	11.67	.248	-.972
Trade Balance	108	-1328.31	.00	-782.82	224.94	.130	.746
Valid N (list wise)	107						

Table 4.1 presents a summary of descriptive statistics of all the variables. Sample mean, standard deviation, maximum, minimum, skewness and kurtosis have been reported. The variables are NIFTY 50, Index of Industrial Production, CPI, exchange rate, FII, FDI, trade balance, gold price and crude oil price.

In the group of 107 observations, the mean of share price (NIFTY 50) is 8201.08, while its maximum price is 12168.45 for our data series and the standard deviation is 2227.47 which is considered to be high. It reflects significant variability in stock prices (NIFTY 50).

Crude oil and gold price mean are 4525.82 and 27234.10 and its standard deviation is 1227.40 and 3097.53 respectively. There is moderate-high variability in oil and gold prices. The maximum price of gold is 38163.29 for our data series and minimum is 27234.10.

Exchange rate mean is 62.42 and standard deviation is 7.27. So, there is a significant variability in dollar price form its mean. The maximum and minimum values of dollar price are 74.35 and 44.37 respectively.

FII mean is 71.95 and its standard deviation is 200.98 which imply that there is a greater degree and even more variability of standard deviation from FII mean.

FDI has a mean value of 46.60 with a standard deviation of 45.73. This shows a moderate variability in Foreign Direct Investment in India.

Consumer price index mean is 123.30 and standard deviation is 15.45 implying that there is moderate variability in consumer price index. Maximum value of CPI is 150.40 and minimum is 97.8.

IIP mean is 115.53 with a standard deviation of 11.67. This shows that IIP has low to moderate variability from its mean. Its min value is 98.30 and max value is 144.10.

Trade Balance mean is -782.82 with a standard deviation of 224.94. This shows greater variability from mean values. Value of trade balance is negative which implies that imports are always greater than exports in past 9 years (which is depicted by 0 as max value).

Table 4.2: Coefficient of Variation

Variables	Coefficient of Variation
Nifty 50	27.16073836
Gold rate	11.37374916
Crude Oil Rate	27.11992749
Exchange Rate (USD-INR)	11.65810061
FII	279.31514
FDI	98.11820797
CPI	12.53751015
IIP	10.10344076
Trade Balance	-28.73463057

Coefficient of Variation

Coefficient of Variation shows that among the above mentioned variables FII shows greatest variability while the least variability is shown in IIP.

Skewness

It is the *degree of distortion* from the symmetrical bell curve or the normal distribution. It measures the lack of symmetry in data distribution.

In the data, NIFTY 50, crude oil, FII, CPI, IIP, Trade balance are fairly symmetrical because their skewness values lies between -0.5 to 0.5.

Gold rate and FDI have skewness of greater than one (>1).This implies that data are highly positive skewed (skewed at the right tail).

Kurtosis

Kurtosis is the degree of peakedness of a distribution. The higher kurtosis, the more peaked is the distribution. Such distribution is called leptokurtic and has value greater than 3. Here in the data only FDI has peaked distribution with a value of 3.761. So it exhibits a leptokurtic distribution. A distribution that is less peaked has value less than 3 and is called platykurtic distribution. Here all the variables other than FDI exhibit platykurtic distribution because their value is less than 3. Distribution with a value equal to 3 is mesokurtic distribution (normal distribution).

4.2. Correlation Analysis

Table 4.3: Correlation Matrix

<table>
<tr><th colspan="11">Correlation Matrix</th></tr>
<tr><th></th><th></th><th>Nifty 50</th><th>Gold rate</th><th>Crude Oil Rate</th><th>USD-INR</th><th>FII</th><th>FDI</th><th>CPI</th><th>IIP</th><th>Trade Balance</th></tr>
<tr><td rowspan="2">Nifty 50</td><td>Pearson Correlation</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Sig. (2-tailed)</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">Gold rate</td><td>Pearson Correlation</td><td>-.187</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Sig. (2-tailed)</td><td>.063</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">Crude Oil Rate</td><td>Pearson Correlation</td><td>.063</td><td>0.274</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Sig. (2-tailed)</td><td>.532</td><td>.006</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">USD-INR</td><td>Pearson Correlation</td><td>-.463</td><td>-.106</td><td>0.191</td><td>1</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Sig. (2-tailed)</td><td>.000</td><td>.292</td><td>.057</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">FII</td><td>Pearson Correlation</td><td>.348</td><td>.155</td><td>.024</td><td>.039</td><td>1</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Sig. (2-tailed)</td><td>.000</td><td>.125</td><td>.814</td><td>.700</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">FDI</td><td>Pearson Correlation</td><td>-.097</td><td>-.025</td><td>.132</td><td>-.067</td><td>.068</td><td>1</td><td></td><td></td><td></td></tr>
<tr><td>Sig. (2-tailed)</td><td>.335</td><td>.806</td><td>.191</td><td>.509</td><td>.503</td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">CPI</td><td>Pearson Correlation</td><td>.844</td><td>.248</td><td>-.219</td><td>.732</td><td>-.298</td><td>.014</td><td>1</td><td></td><td></td></tr>
<tr><td>Sig. (2-tailed)</td><td>.000</td><td>.013</td><td>.029</td><td>.000</td><td>.003</td><td>.888</td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">IIP</td><td>Pearson Correlation</td><td>.139</td><td>.046</td><td>-.101</td><td>.043</td><td>.085</td><td>.387</td><td>.203</td><td>1</td><td></td></tr>
<tr><td>Sig. (2-tailed)</td><td>.168</td><td>.651</td><td>.317</td><td>.672</td><td>.401</td><td>.000</td><td>.043</td><td></td><td></td></tr>
<tr><td rowspan="2">Trade Balance</td><td>Pearson Correlation</td><td>-.443</td><td>-.166</td><td>-.323</td><td>.039</td><td>.249</td><td>.030</td><td>.248</td><td>-.059</td><td>1</td></tr>
<tr><td>Sig. (2-tailed)</td><td>.000</td><td>.099</td><td>.001</td><td>.697</td><td>.013</td><td>.771</td><td>.013</td><td>.559</td><td></td></tr>
<tr><td colspan="11">Correlation is significant at the 0.05 level (2-tailed).</td></tr>
</table>

The above table shows correlation between macroeconomic variables and NIFTY 50 as well as between various macroeconomic variables. Here, we have used Karl Pearson's correlation analysis with two tailed and 5% significant level. The results reveal that there is no significant instead there is very low or low or moderate

relationship among macroeconomic variables and NIFTY 50 as well as among various economic variables.

Gold rate, exchange rate, FDI, trade balance have low to moderate negative correlation with NIFTY 50 which indicates that if price of any of these variables goes up then price of NIFTY 50 goes down and vice-versa. Crude oil, FII, CPI, IIP have positive correlation with NIFTY 50 which indicates that if price of any of these variables increases then price of NIFTY 50 also increases and vice versa. Only CPI shows a strong positive correlation with NIFTY 50 that is .844. Exchange rate, FII, CPI and trade balance shows statistically significant results with NIFTY 50 because their p values (sig. values) are less than the significance level (0.05)

From the above correlation matrix, there are some significant correlations between different macro-economic variables as well. CPI shows high positive correlation with the exchange rate with value 0.732 and p value equal to 0.000 which is less than the significance level which shows that correlation between CPI and exchange rate is statistically significant. CPI has a positive correlation with all the variables except crude oil and FII.

Gold rate has low to moderate positive correlation with all the variables except exchange rate, FDI and trade balance. Crude oil shows low to moderate positive correlation with all variables except CPI, IIP and trade balance. It is concluded from the matrix that there is no strong correlation found between various variables except only few like CPI-NIFTY50 (.844) and CPI-exchange rate (.732).

From the correlation matrix the proportion of variation in NIFTY 50 cannot be strongly attributed to the macro-economic variables because of low to moderate correlation values. So, to make this study more extensive and relevant, regression analysis is being conducted.

4.3. Econometric Regression Analysis

4.3.1 R-Square

Table 4.4: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.983[a]	.966	.963	430.76792

a. Predictors: (Constant), Trade Balance, FII, FDI, Crude Oil Rate, Gold rate , Exchange Rate (USD-INR), IIP, CPI

b. Dependent Variable: Nifty 50

R denotes the correlation between predicted and observed values of NIFTY 50 prices. In our case, R = 0.983. Since this is a very high correlation, our model predicts NIFTY 50 rather precisely.

R-Square is the proportion of variance in the dependent variable (NIFTY 50) which can be predicted or explained from the independent variables (macroeconomic variables). This value indicates that 96.6% of the variance in NIFTY 50 prices can be predicted from the macroeconomic variables. R-Square is also called the coefficient of determination. It shows the model fitness of a regression equation

Adjusted R-square – Some of the increase in R-square would be simply due to chance rather than due to the predictors. The adjusted R-square tries in giving a more reliable value to guess the R-squared for the population. The value of R-square was .966, while the value of Adjusted R-square was .963

4.3.2 ANOVA

Table 4.5: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	512552287.901	8	64069035.988	345.272	.000[b]
	Residual	18184977.970	98	185561.000		
	Total	530737265.871	106			

a. Dependent Variable: Nifty 50

b. Predictors: (Constant), Trade Balance, FII, FDI, Crude Oil Rate, Gold rate , Exchange Rate (USD-INR), IIP, CPI

Sum of Squares – These are the Sum of Squares associated with the three sources of variation, Total, Model (regression) and Residual. These formulas can be expressed as:

SST (Total): The total variability around the mean.

SSE (Residual or Error): The sum of squared errors in prediction

SSR (Regression): This would be the squared differences between the predicted value of Y and the mean of Y.

SST (Total) = SSR (Regression) + SSE (Residual).

The Mean Square Regression has F-value (64069035.988) divided by the Mean Square Residual (185561.000), yielding F=345.272. The p-value associated with this F value is very small (0.0000). So the p value is less than the significance level we can say that macroeconomic variables reliably predict the dependent variable (NIFTY 50).The capacity in the table below where each of the individual variables are listed is the capability of independent variable to predict the dependent variable is addressed.

4.3.3 t-value and p-value

Table 4.6: Individual Variables

Coefficients					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	-9012.213	648.721		-13.892	.000
Gold rate	-.032	.017	-.042	-1.881	.063
Crude Oil Rate	.029	.046	.016	.627	.532
Exchange Rate (USD-INR)	-81.600	15.775	-.263	-5.173	.000
FII	.790	.215	.071	3.675	.000
FDI	-1.000	1.032	-.020	-.969	.335
CPI	166.618	10.710	1.142	15.557	.000
IIP	13.727	9.874	.072	1.390	.168
Trade Balance	-1.177	.241	-.112	-4.893	.000

a. Dependent Variable: Nifty 50

Null Hypothesis (H 0): No significant relationship between NIFTY 50 & each macroeconomic variable.

Alternative Hypothesis (H1): Significant relationship between NIFTY 50 & each macroeconomic variable.

Unstandardized Coefficients

B value

The B factor or value in the regression method or formula are used for identifying or predicting the dependent variables. The variables are calculated in their natural unit hence called unstandardized coefficients. Regression equation is as follows:

NIFTY 50 (predicted) = (-9012.213) + (-.032)*gold rate + (0.029)*crude oil rate + (-81.6)*exchange rate + (0.790)*FII + (-1.00)*FDI + (166.618)*CPI + (13.727)*IIP + (-1.177)*trade balance

These estimates tell the amount of increase in NIFTY 50 prices that would be predicted by a 1 unit increase in the predictor variables.

The coefficient (parameter estimate) of gold rate is -0.032. So for every unit increase in gold price, a 0.032 decrease in NIFTY 50 prices is predicted holding the other variables constant. Similarly the coefficient for crude oil rate is 0.029, so for every unit increase in crude oil price there will be a 0.029 corresponding increase in NIFTY 50 prices. Similarly, for other predictor variables this can be analysed.

t value and Sig. (p- value)

These columns provide the t-value and 2 tailed p-value used in testing the null hypothesis. If you use a 2 tailed test, then you would compare each p-value to your preselected value of alpha (0.05). Coefficients having p-values less than alpha are statistically significant, in that case we will reject the null hypothesis.

Gold rate: Its coefficient is not statistically significant because p-value is 0.063 which is greater than 0.05 (alpha level). So we accept null hypothesis (H0). This means that there is no significant relationship between NIFTY 50 and gold rate.

Crude oil rate: Its coefficient is not statistically significant because p-value is 0.532 which is greater than 0.05 (alpha level). So we accept null hypothesis (H0). This means that there is no significant relationship between NIFTY 50 and crude oil rate.

Exchange rate (USD-INR): Its coefficient is statistically significant because p-value is 0.000 which is less than 0.05 (alpha level). So we reject null hypothesis (H0). This means that there is a significant relationship between NIFTY 50 and exchange rate.

Foreign Investment Inflows (FII): Its coefficient is statistically significant because p-value is 0.000 which is less than 0.05 (alpha level). So we reject null hypothesis (H0). This means that there is a significant relationship between NIFTY 50 and FII.

Foreign Direct Investment (FDI): Its coefficient is not statistically significant because p-value is 0.335 which is greater than 0.05 (alpha level). So we accept null hypothesis (H0). This means that there is no significant relationship between NIFTY 50 and FDI.

Consumer Price Index (CPI): Its coefficient is statistically significant because p-value is 0.000 which is less than 0.05 (alpha level). So we reject null hypothesis (H0). This means that there is a significant relationship between NIFTY 50 and CPI.

Index for Industrial Production (IIP): Its coefficient is not statistically significant because p-value is 0.168 which is greater than 0.05 (alpha level). So we accept null hypothesis (H0). This means that there is no significant relationship between NIFTY 50 and IIP.

Trade Balance: Its coefficient is statistically significant because p-value is 0.000 which is less than 0.05 (alpha level). So we reject null hypothesis (H0). This means that there is a significant relationship between NIFTY 50 and trade balance.

Table 4.7: p-value

Variables	t- value	p-value	Remarks
Gold rate	-1.881	0.063	Accept H0
Crude oil rate	.627	0.532	Accept H0
Exchange rate	-5.173	0.000	Reject H0
FII	3.675	0.000	Reject H0
FDI	-.969	0.335	Accept H0
CPI	15.557	0.000	Reject H0
IIP	1.390	0.168	Accept H0
Trade Balance	-4.893	0.000	Reject H0

So exchange rate, FII, CPI and trade balance have statistically significant impact on NIFTY 50 while other variables impact is not statistically significant. This implies that major variation in NIFTY 50 price is explained by exchange rate, FII, CPI and trade balance.

5. Conclusion

In this paper, the study performed necessary analysis to fulfil the research objectives under study. The macroeconomic variables are represented by the industrial production index, consumer price index, exchange rate, gold price, crude oil price, foreign institutional investment, foreign direct investment and trade balance. Indian stock market is represented by NIFTY 50. Monthly data for a time span of 9 years (from April 2011 – March 2020) was considered. The paper employed econometric regression analysis and correlation analysis to examine such relationships. The results are interesting and useful in understanding the Indian stock market pricing mechanism as well as its return generating process.

- On the basis of overall analysis it can be concluded that four out of eight variables have relatively more significant relationship with Indian stock market. These factors are exchange rate, foreign institutional investment, CPI and trade balance. Gold rate, Exchange rate, FDI and Trade balance shows a negative relationship with NIFTY50 whereas FII, Consumer price index, Crude oil rate and IIP shows positive relationship with NIFTY 50. The result has been concluded on the basis of correlation and regression analysis.

- Exchange rate, FII, CPI and trade balance have statistically significant impact on NIFTY 50 while other variables impact is not statistically significant. This implies that major variation in NIFTY 50 price is explained by exchange rate, FII, CPI and trade balance.

- Also the value of R-square is a conclusive evidence that collectively the selected Macro factors have more explanatory powers indicating that other factors which bring variability in share prices were not considered. It can be concluded that macroeconomic indicators drive the Indian stock market. These results of the project are not decisive for an investment.

- The correlation between Gold rate, exchange rate, FDI, trade balance and NIFTY 50 is negative but is only low to moderate. Crude oil, FII, CPI and IIP have a positive correlation with NIFTY 50 but only CPI shows a high correlation with NIFTY 50.

6. Limitations

These are the various limitations that are recorded during the study:

1. The study makes use of the secondary data which was readily available from various sources. So there might be a case where our data is unreliable.

2. The conclusion is limited by the time duration selected and also the indicators selected. Also the duration of 9 years has been taken into account for analysing the project.

3. The research relates to only 8 macroeconomic indicators which might not depict situation clearly. In the study variables which are of vital importance such as economic performance of a country (GDP) has not been analysed which could be analysed in further studies.

4. Tests such as Correlation and Regression analysis were used to draw the findings and the results. So, various other tools could be used to do the same study.

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Data Source Links

[1] Monthly National stock exchange index NIFTY50 taken from National Stock exchange limited site.

https://www.nseindia.com/

[2] Monthly data of gold price and crude oil price taken from multi commodity exchange website.

https://www.mcxindia.com/

[3] Monthly data of exchange rate (dollar price), Foreign Institutional Investments (FII), Foreign Direct Investment (FDI), Consumer Price Index (CPI), Index for Industrial Production (IIP), Trade Balance from Reserve Bank of India (RBI) database site.

http://dbie.rbi.org.in/

ANNEXURE 1

The Data used in this report has been taken from www.rbi.org., www.nseindia.com , www.mcxindia.com. All the data is authentic and has not been tampered before analysing. All the data used is given in the following snapshots:

Date	Nifty 50	Gold rate (Price/10gm)	Crude Oil Rate(Rs. per barrel)	Exchange Rate (USD-INR)	FIIs (Rs. Crore)	FDI (Rs. Crore)	CPI	IIP	Trade Balance (Rs. Crore)
Mar-20	8,597.75	38,163.29	2,392.98	74.3507	0	0	148.7	0	0
Feb-20	11,201.75	36,809.87	3,811.78	71.4885	81	119	149.1	133.3	-704
Jan-20	11,962.10	35,909.19	4,395.91	71.3138	-9	77	150.2	137.1	-1082
Dec-19	12,168.45	33,966.61	4,509.77	71.1926	-36	88	150.4	134.0	-872
Nov-19	12,056.05	33,889.42	4,314.32	71.4517	426	55	148.6	128.8	-899
Oct-19	11,877.45	34,261.00	4,069.14	71.0394	190	89	147.2	124.0	-826
Sep-19	11,474.45	34,759.74	4,282.87	71.3337	159	72	145.8	122.9	-827
Aug-19	11,023.25	34,434.74	4,102.97	71.1457	-37	52	145.0	126.2	-982
Jul-19	11,118.00	31,360.00	4,230.22	68.8083	21	50	144.2	131.8	-976
Jun-19	11,788.85	30,442.00	4,149.67	69.4389	139	64	142.9	129.3	-1112
May-19	11,922.80	28,899.54	4,664.02	69.7731	135	83	142.0	135.4	-1175
Apr-19	11,748.15	28,799.16	4,761.33	69.4274	84	62	141.2	126.5	-1135
Mar-19	11,623.90	29,156.38	4,432.04	69.4786	646	170	140.4	144.1	-762
Feb-19	10,792.50	30,322.41	4,352.94	71.2218	132	39	139.9	127.6	-693
Jan-19	10,830.95	29,481.36	4,003.08	70.7329	22	26	139.6	134.4	-1064
Dec-18	10,862.55	28,570.25	3,822.07	70.7311	-97	80	140.1	133.9	-1028
Nov-18	10,876.75	28,281.38	4,476.09	71.8542	213	37	140.8	126.1	-1267
Oct-18	10,386.60	28,862.67	5,648.69	73.6323	-279	105	140.7	132.8	-1328
Sep-18	10,930.45	27,949.67	5,448.55	72.2153	-149	76	140.2	128.8	-1082
Aug-18	11,680.50	26,955.04	4,942.53	69.5465	-342	39	140.4	128.0	-1246
Jul-18	11,356.50	27,429.68	4,992.51	68.6934	314	68	139.8	125.7	-1276
Jun-18	10,714.30	28,026.31	4,879.75	67.7931	-285	93	138.5	127.7	-1197
May-18	10,736.15	28,195.80	4,924.08	67.5394	-114	66	137.8	129.6	-1016
Apr-18	10,739.35	28,272.20	4,516.93	65.6363	-211	80	137.1	122.6	-919
Mar-18	10,113.70	27,779.62	4,171.72	65.0213	-88	76	136.5	140.3	-887
Feb-18	10,492.85	27,633.61	4,085.16	64.3738	21	26	136.4	127.4	-762
Jan-18	11,027.70	27,332.15	4,215.16	63.6400	217	40	136.9	132.3	-973
Dec-17	10,530.70	26,203.61	3,930.99	64.2423	-5	35	137.2	130.6	-912

Date	Nifty 50	Gold rate (Price/10gm)	Crude Oil Rate(Rs. per barrel)	Exchange Rate (USD-INR)	FIIs (Rs. Crore)	FDI (Rs. Crore)	CPI	IIP	Trade Balance (Rs. Crore)
Nov-17	10,226.55	26,825.82	3,887.81	64.8626	106	39	137.6	125.8	-979
Oct-17	10,335.30	26,863.95	3,574.53	65.0813	253	34	136.1	122.5	-951
Sep-17	9,788.60	27,324.45	3,413.19	64.4409	48	97	135.2	123.1	-605
Aug-17	9,917.90	26,474.46	3,194.46	63.9684	44	15	135.4	122.1	-813
Jul-17	10,077.10	25,710.47	3,071.23	64.4559	65	35	134.2	118.0	-768
Jun-17	9,520.90	26,195.54	2,975.01	64.4430	274	60	132.0	119.3	-905
May-17	9,621.25	25,892.81	3,213.83	64.4248	369	36	131.4	124.8	-923
Apr-17	9,304.05	26,364.92	3,365.04	64.5071	125	97	131.1	117.3	-920
Mar-17	9,173.75	26,183.69	3,355.09	65.8767	596	199	130.9	133.2	-701
Feb-17	8,879.60	26,715.54	3,647.03	67.0755	115	48	130.6	119.2	-639
Jan-17	8,561.30	26,190.66	3,649.89	68.0804	25	28	130.3	123.1	-674
Dec-16	8,185.80	25,349.51	3,572.84	67.9004	-297	69	130.4	121.7	-716
Nov-16	8,224.50	26,975.01	3,056.29	67.6257	-467	51	131.2	115.9	-906
Oct-16	8,625.70	27,274.63	3,290.46	66.7477	-3	113	131.4	120.3	-743
Sep-16	8,611.15	28,561.42	3,006.05	66.7377	192	-75	130.9	118.2	-605
Aug-16	8,786.20	28,937.97	3,004.16	66.9396	104	-84	131.1	116.5	-516
Jul-16	8,638.50	28,982.58	2,966.28	67.2076	152	-43	131.1	116.8	-512
Jun-16	8,287.75	27,702.67	3,208.66	67.2969	-19	28	130.1	119.7	-556
May-16	8,160.10	27,206.46	3,072.75	66.9067	-109	4	128.6	121.3	-393
Apr-16	7,849.80	26,636.27	2,708.63	66.4695	209	102	127.3	113.7	-321
Mar-16	7,738.40	26,934.43	2,503.95	67.0219	91	81	126.0	127.6	-295
Feb-16	6,987.05	26,405.67	2,117.58	68.2377	-85	37	126.0	117.8	-449
Jan-16	7,563.55	23,832.92	2,004.00	67.2523	-60	56	126.3	118.9	-516
Dec-15	7,946.35	23,109.50	2,435.40	66.5955	-117	101	126.1	118.9	-766
Nov-15	7,935.25	23,148.33	2,847.43	66.1171	-196	46	126.6	110.3	-683
Oct-15	8,065.80	24,335.08	3,055.95	65.0580	344	65	126.1	115.5	-631
Sep-15	7,948.90	24,024.72	3,064.43	66.2178	-94	45	125.4	112.6	-673
Aug-15	7,971.30	23,466.55	2,973.16	65.0723	-163	31	124.8	112.0	-807

Date	Nifty 50	Gold rate (Price/10gm)	Crude Oil Rate(Rs. per barrel)	Exchange Rate (USD-INR)	FIIs (Rs. Crore)	FDI (Rs. Crore)	CPI	IIP	Trade Balance (Rs. Crore)
Jul-15	8,532.85	23,165.24	3,458.51	63.6350	22	31	123.6	111.8	-833
Jun-15	8,368.50	24,339.18	3,915.30	63.8607	-142	33	123.0	110.8	-716
May-15	8,433.65	24,672.52	3,988.78	63.8003	-125	28	121.6	113.0	-658
Apr-15	8,181.50	24,269.89	3,610.82	62.7532	249	31	120.7	107.3	-713
Mar-15	8,491.00	23,743.63	3,299.23	62.4498	127	46	120.2	121.3	-712
Feb-15	8,901.85	24,552.65	3,398.51	62.0376	234	17	119.7	109.9	-417
Jan-15	8,808.90	25,069.61	2,927.20	62.2259	413	13	119.5	114.3	-488
Dec-14	8,282.70	24,287.74	3,806.55	62.7530	-25	20	119.4	115.3	-575
Nov-14	8,588.25	23,384.25	4,748.53	61.7042	298	6	120.1	109.4	-1001
Oct-14	8,322.20	24,192.69	5,280.84	61.3420	106	22	120.1	106.0	-831
Sep-14	7,964.80	24,285.67	5,835.69	60.8649	144	23	120.1	110.2	-880
Aug-14	7,954.35	25,441.02	6,092.56	60.8952	127	34	120.3	108.0	-648
Jul-14	7,721.30	25,393.21	6,320.51	60.0586	325	25	119.2	110.4	-856
Jun-14	7,611.35	24,638.18	6,471.05	59.7307	288	17	116.7	109.7	-742
May-14	7,229.95	24,670.14	6,273.13	59.3050	457	15	115.8	111.0	-655
Apr-14	6,696.40	25,280.66	6,329.60	60.3566	-4	10	115.1	106.6	-602
Mar-14	6,704.20	26,276.36	6,343.00	61.0140	329	127	114.2	118.5	-668
Feb-14	6,276.95	26,110.84	6,529.28	62.2540	94	209	113.6	106.7	-517
Jan-14	6,089.50	24,939.65	6,344.00	62.0760	162	213	113.6	112.3	-587
Dec-13	6,304.00	24,409.72	6,534.28	61.9103	182	-10	114.5	110.9	-631
Nov-13	6,176.10	25,808.83	6,435.78	62.6330	-2	5	116.3	101.9	-599
Oct-13	6,299.15	26,174.95	6,497.77	61.6156	-23	-13	114.8	105.7	-653
Sep-13	5,735.30	27,706.84	6,926.83	63.7521	10	8	113.7	105.7	-390
Aug-13	5,471.80	27,561.91	6,836.67	63.2088	-128	16	112.4	104.3	-676
Jul-13	5,742.00	24,789.56	6,292.38	59.7754	-281	14	111.0	104.7	-747
Jun-13	5,842.20	25,276.03	5,817.69	58.3973	-510	-2	109.3	101.3	-660
May-13	5,985.95	25,102.84	5,468.66	55.0108	369	7	107.5	106.0	-1049
Apr-13	5,930.20	26,097.88	5,375.04	54.3757	84	-6	106.7	102.6	-927

Date	Nifty 50	Gold rate (Price/10gm)	Crude Oil Rate(Rs. per barrel)	Exchange Rate (USD-INR)	FIIs (Rs. Crore)	FDI (Rs. Crore)	CPI	IIP	Trade Balance (Rs. Crore)
Mar-13	5,682.55	27,949.91	5,575.84	54.4046	68	69	106.1	115.2	-566
Feb-13	5,693.05	28,216.49	5,784.94	53.7737	225	8	105.9	101.4	-759
Jan-13	6,034.75	29,291.46	5,708.32	54.3168	332	1	105.1	107.2	-1031
Dec-12	5,905.10	29,682.35	5,526.62	54.6478	267	40	104.6	107.1	-961
Nov-12	5,879.85	30,389.67	5,536.01	54.7758	111	38	104.3	98.3	-942
Oct-12	5,619.70	29,837.44	5,476.43	53.0239	156	43	103.6	103.7	-1072
Sep-12	5,703.30	30,707.82	5,798.48	54.6055	229	27	102.9	99.0	-936
Aug-12	5,258.50	29,219.11	5,848.75	55.5598	87	24	102.2	99.9	-787
Jul-12	5,229.00	28,556.56	5,372.19	55.4948	119	24	101.1	101.5	-972
Jun-12	5,278.90	28,896.30	5,083.60	56.0302	-23	28	99.8	102.3	-629
May-12	4,924.25	27,852.79	5,655.94	54.4735	1	43	98.6	105.0	-946
Apr-12	5,248.15	27,559.37	5,888.49	51.8121	-68	41	97.8	99.3	-745
Mar-12	5,295.55	27,206.07	5,927.55	50.3213	-28	48	100.0	100.0	-681
Feb-12	5,385.20	27,671.54	5,540.26	49.1671	454	65	100.0	100.0	-734
Jan-12	5,199.25	27,333.11	5,484.92	51.3392	277	28	100.0	100.0	-902
Dec-11	4,624.30	27,848.03	5,486.72	52.6769	121	32	100.0	100.0	-773
Nov-11	4,832.05	28,435.77	5,343.29	50.8564	4	48	100.0	100.0	-805
Oct-11	5,326.60	26,469.36	4,916.61	49.2579	-25	21	100.0	100.0	-864
Sep-11	4,943.25	27,284.04	4,811.93	47.6335	-62	46	100.0	100.0	-629
Aug-11	5,001.00	25,692.05	4,550.04	45.2788	-82	47	100.0	100.0	-689
Jul-11	5,482.00	22,533.59	4,793.30	44.4174	68	49	100.0	100.0	-652
Jun-11	5,647.40	22,127.28	4,747.57	44.8536	33	65	100.0	100.0	-642
May-11	5,560.15	21,905.57	4,851.80	44.9045	-77	40	100.0	100.0	-841
Apr-11	5,749.50	21,203.34	5,159.40	44.3700	153	38	100.0	100.0	-582